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Abstract

The aim of this paper is to analyze the respective impacts of remittances, health aid and public spending on the access to health care services in developing countries. The specific objectives are threefold. Firstly, we quantify the differential impacts of remittances on the access to public and private health care services. Secondly, we determine whether remittances and foreign health aid are complements or substitutes in the access to health care services. Lastly, we evaluate the heterogeneity of the impact of remittances in the access to public and private health care services by quintile of income. We provide a rigorous econometric analysis by controlling for the endogeneity of remittances, public spending and foreign aid. We find that remittances, health aid and public spending are important determinants of access to health services in recipients' countries. Another interesting result comes from the fact that, remittances lead to a sectorial glide in the uses of health care services from the public to the private sector for the intermediate income class. This result holds also for the richer quintiles that are the major recipients of remittances in developing countries. Moreover, remittances and foreign health aid are complements for the access to health care services in "low" income countries. Finally, these results suggest that policies aiming at increasing remittances are appropriate for developing countries but also that, the "optimal" therapy for the "low" income countries is the combination of remittances and foreign aid.

Keywords: Remittances, health aid, public spending, access to health care services, developing countries, instrumental variables method

JEL codes: I1 F24 O19

1. INTRODUCTION

Several arguments can be evoked in explaining the interest on studies undertaken on health care in developing countries. First of all, the status of health of the populations is a major preoccupation insofar as it determines the level of productivity of the labor force and contributes to growth as well as to poverty reduction (Bloom and al., 2004; Carstensen & Gundlach, 2006; Weil, 2007). The key role of health as input for development has been reaffirmed at the international level, as evidenced by the Millennium Development Goals (MDGs). Indeed, three of the eight objectives of the MDGs are centered directly on health. These are: the maternal health, the fight against HIV AIDS and the reduction of child mortality. Secondly, the paradox to which developing countries are confronted rest on the size of their needs in the access to health care services in a context of severe financial constraints. Public aid to development that remains one of the main sources of the external financing of health care services in developing countries in general and in Africa in particular is rather stagnating whereas the possibilities of the internal sources of financing health care in these countries are further constrained by the lack of fiscal resources and by numerous institutional problems.

Indeed, a number of recent studies on health care systems in Africa pointed out the existence of substantial gaps between budgets voted at the central level and disposable resources that are actually received by the local communities (Gauthier & Wayne, 2009; Reinikka & Svensson, 2004, 2005). Beside the problem of corruption and bad governance (Rajkumar & Swaroop, 2008), the concerns for the progressivity of the advantages of public spending on health or more generally, the question of equity in the access to health care services remain acute in the context of developing countries in general, and of African countries in particular (Castro - Leal and al., 1999; Gwatkin, 2003; Gwatkin and al., 2007; Kamgnia, 2008; Kamgnia and al., 2008; Berthelemy & Seban, 2009; Yazbeck, 2009).

If public spending and foreign aid on health stand as key sources of financing health and of inequality reduction in the access to health care services in developing countries, other important sources for financing heath care services do exist as well. Indeed, several recent papers (Edward & Uretas, 2003, Chauvet and al., 2008, Amuedo–Dorantes and al., 2007) pointed out the important role that remittances play in the financing of households' health. Remittances constitute one of the most important features of the current globalization and Ratha & Zhimey (2008) for the World Bank estimate to 240 billion of US dollars, the total volume of funds received by developing countries through these channels in 2007.

The positive impact of remittances on development led to a number of studies. The positive effects of remittances on the accumulation of human capital (Borraz, 2005; Hanson & Woodruff, 2003; Calero and al., 2008; Yang, 2008; Bansak & Chezum, 2009), on the accumulation of physical capital (Woodruff & Zenteno, 2007), on the reduction of income inequalities (Koechlin & Léon, 2007; Chauvet & Mesplé-Somps, 2007), on consumption (Adams and al., 2008), on economic growth (Giuliano & Ruiz - Arranz, 2008; Catrinescu and al., 2009) and on poverty reduction (Adams & Page, 2005; Gupta and al., 2009) have been well demonstrated.

The interest for studies on remittances is justified on at least three grounds. Firstly, remittances differ from the other types of funds received by developing countries insofar as they directly go in the pocket of the households. Secondly, remittances exhibit a relative stability, or to say a somehow countercyclical evolution, contrary to the other sources of funds received by developing countries. Thirdly, following the international statistical databases, the volume of remittances flowing into developing countries exceeds the flows of aid, what makes remittances a non negligible source of funds of which it becomes imperative to size all the effects on receiving countries.

The current study expands on existing empirical studies that have analyzed the impact of remittances on the accumulation of human capital. However it differs from the other studies on that it stresses on the *causal* effects of remittances on the level of access to health care services as well as on equity in the access to health services.

The general objective of the current study is to analyze the contributions of remittances, public spending and foreign aid in the access to health care services in developing countries. The specific objectives are:

- to quantify the differential impacts of remittances in the access of public and private health care services;
- to determine the interactions between remittances and foreign health aid in the overall access to health care services;
- to evaluate the heterogeneity of the impact of remittances in the access to public and private health care services by quintile of income.

These hypotheses are tested by using instrumental variables approaches, a method which allows us to deal with the potential endogeneity of our variables of interest. Using a comprehensive and recent database on intra-country access to health care services at the international level (Health, Nutrition and Population (HNP) database), our results show that remittances, health aid and public spending are important factors of access to health services in developing countries. Moreover, we have found that migrants' remittances appear to be complementary to health aid in the "low" income countries and not necessarily in the others. We also find that remittances lead to a sectorial glide in the uses of health care services from the public to the private sector for the intermediate income class and for the richer quintiles that are the major recipients of remittances in the developing world.

The rest of the paper is organized as follow. Section 2 is devoted to the literature review of the determinants of access to health care services in developing countries. Section 3 presents firstly a simple theoretical model of the relationship between remittances and the demand for medical services in a constrained environment, and secondly the econometric equations, estimation method and data used. We discuss our econometric results in section 5 while section 6 concludes on policy implications.

2. LITERATURE REVIEW

2.1. Traditional determinant of access to health services in developing countries

Bryant et al. (2002) studied the extent to which selected social and economic factors are influential in determining the participation in preventive cancer screening programs (namely screening mammography and Pap tests) in Prince George, a large community in northern British Columbia. Using the 1994 National Population Health Survey, which contains a sample of 416 women, they show through a series of logistic regression analyses that immigrant women, single women and women with less education in northern British Columbia experience low participation in health services, resulting in a higher risk for poor health and a poor quality of life. They also found no association between social factors and previous mammography use.

Falkingham (2004) uses the Tajikistan Livings Standard Survey to examine the extent to which the level and the distribution of out-of-pocket payments for health care payments act as barriers to health-care access. He shows that there are significant differences in health-care utilization rates across socio-economic groups and that these differences are related to ability to pay.

Using multilevel logistic regression models and data from the 2001 Demographic and Health Survey of Mali, Gage (2007) explores factors that determine the utilization of maternal health care in rural Mali. She shows that the dearth of health facilities, the lack of transportation means, distance, household poverty and personal problems are some barriers to the access of maternal health care services. In addition, living in area where women visit health services and living in close proximity to people with secondary or higher education increase the probability of women to use maternal health services.

Sepehri and al. (2008) examine the impacts of individual, household and commune-level characteristics on a woman's decision to seek prenatal care, on the number of prenatal visits and on the choice between giving birth at a health facility or at home. They used data from the Vietnam latest National Household Survey data for 2001–2002 and a random intercept logistic model specification. They show that women decision regarding the place of child birth and the utilization of prenatal care are jointly determined by the observed individual characteristics (insurance status, level of education, marital status, birth order of the child, unwanted pregnancy), household characteristics (income class, household size, ethnicity, distance to the nearest hospital) and commune-level characteristics (urban or rural, income per capita) as well as by the unobserved commune-level characteristics.

Murawski & Church (2009) propose a model that can be used to maximize the access to health facilities by making selected improvements to the road system. They have applied their model to the Suhum District of Ghana and their application shows that significant increases to all season health services access can be obtained by a modest level of road investment.

Using household survey and ministry data in some African countries (South Africa, Cote d'Ivoire, Ghana, Guinea, Kenya, Madagascar and Tanzania), Castro-Leal and al. (2000) show that public spending in health favours mostly the better-off rather than the poor.

Seban & Berthelemy (2009) is one of the first papers using macroeconomic data to address the issue of the access to health services in developing countries. Using Health, Nutrition and Population (HNP) data compiled by Gwatkin (2007), they show that access to health services depends on some socioeconomic characteristics of household such as mother's education level and wealth, but they find no evidence that public health expenditure is a robust determinant of access to health services in developing countries. However, one of the main drawback of their empirical analysis is they have not taken into account the potential endogeneity of public spending on health, what can be lead to severe bias in the parameters estimated.

2.2. International migration and remittances in the literature on health in developing countries

The literature on the link between international migration and health in developing countries is recent and can be split into two broad research areas. On the one hand, authors have analyzed the impact of international migration and remittances directly on the health status in recipient countries. On the other hand, the question turns on the impact of migration and remittances on the access to health care.

International migration, remittances and health status

Few papers have addressed the impact of migration and remittances on health. The exceptions are mostly focused on infant mortality. Brockerhoff (1990) and Ssengonzi and al. (2002) investigate the effects of female migration on the survival chances of their children in Senegal and Uganda, respectively. They find that rural to urban migration significantly increases child survival chances. With data on Mexican municipalities, Lopez-Cordova (2004) concludes that larger proportions of remittances and migrant households at the community level are associated with lower infant mortality rates.

Kanaiaupuni and Donato (1999) analyzed the effects of village migration and remittances on infant survival outcomes in Mexico, and concluded that remittances reduce infant mortality. However, the authors reach an opposite conclusion for the effect of migration: higher rates of infant mortality in communities experiencing intense migration.

Further evidence of the impact of migration on child health has been provided by Hildebrandt and McKenzie (2005). The authors investigate the impact of international migration on several children health outcomes in Mexico. Their results show that migrant households have lower rates of infant mortality and higher birth weights. Moreover, they find evidence that migration also raises maternal health knowledge and the likelihood that the child was delivered by a doctor. On the other hand, preventative health care (such as

breastfeeding, visits to doctors, and vaccinations) seem to be less likely for children from migrant households.

Fajnzylber and Lopez (2007) analyze the effect of international migrants' remittances on anthropometric child health indicators in two countries, Guatemala and Nicaragua. They also estimate the impact of remittances on the probability that the delivery of children born in the year preceding the survey was assisted by a doctor, and on the probability that children aged 2 to 5 received the complete set of required vaccinations. The anthropometric measures on which they focus are the Weight-for- Age (WAZ) and Height-for-Age (HAZ) z-scores for children aged 1 to 5 years old. Their results suggest that children from households that report receiving remittances tend to exhibit higher health outcomes than those from non-recipients households with similar demographic and socio-economic characteristics. The results also indicate that the impact of remittances on children health is concentrated on low income households located in the first quintile of the income distribution.

Bhargava and Docquier (2008) use Country-level longitudinal data at three-year intervals over 1990–2004 to analyze the factors affecting emigration of physicians from Sub-Saharan countries and the effects of this medical brain drain on life expectancy and number of deaths due to AIDS. They estimate a triangular system of equations in a random effects specification for medical brain drain rates, life expectancy, and numbers of deaths due to AIDS. They found that in countries in which the HIV prevalence rate exceeds 3 percent, a doubling of the medical brain drain rate is associated with a 20 percent increase in adult deaths from AIDS.

Chauvet and al. (2008) analyze the respective impact of aid and remittances on human development as measured by infant and child mortality rates with a panel data on a sample of 109 developing countries, and cross-country quintile-level data on a sample of 47 developing countries. Their results suggest that remittances significantly improve child health. By contrast, medical brain drain, as measured by the expatriation rate of physicians, is found to have a harmful impact on health outcomes, so net impact of migration on human development is therefore mitigated. Lastly, remittances seem to be much more effective in improving health outcomes for children belonging to the richest households.

Migration, remittances and access to health services

Increased spending on health services by migrant households may improve the access to private sector health services for everyone in the community as service providers move to the community in response to this increased demand. In a study of the consequences of migration in Kerala (India), Zachariah and al. (2001) find that the receipt of remittances is associated with greater use of hospital facilities to treat illness, and a three-fold increase in the use of private hospitals for childbirth.

Lindstrom & Munoz-Franco (2006) use data from the 1995 Guatemalan Survey of Family Health (EGSF) conducted in four rural regions of Guatemala to explore how migration experience and social ties to migrants influence the likelihood of using formal maternal health-care services. They identify assimilation, diffusion, and remittances as three potential pathways through which migration can affect health-care services utilization in rural areas. They find that urban migration experience and having relatives abroad, are associated with a greater likelihood of formal prenatal care utilization, after taking account of background characteristics and enabling resources. Migration experience at all levels is also strongly associated with formal delivery assistance; however, this association operates primarily through the positive association between migration and enabling resources. Moreover, financial cost and geographic access are the most important barriers to formal delivery assistance, whereas awareness and acceptance remain as important barriers to the use of formal prenatal care in rural Guatemala.

Reanne et al. (2009) use data from a 2006 survey of two localities in the municipal city of Tepoztlán and Morelos (Mexico). They used logistic regressions to determine whether household remittances expenditures on health care were conditional to the type of health insurance coverage. They found that individuals who lacked insurance coverage or who were covered by the *Seguro Popular* program are significantly more likely

to reside in households that spend remittances on health care than individuals covered by an employer-based insurance program.

3. THEORETICAL MODEL AND EMPIRICAL SPECIFICATIONS

The three following hypotheses are successively tested in this paper:

- remittances increase the access to private health care services more than that of public services in developing countries while foreign aid and public spending increase more the utilization of public health care services;
- remittances and foreign aid are complements in poor countries and substitutes in rich countries in the access to health services.
- remittances lead to a sectorial glide in the uses of health care services from the public to the private sectors for the intermediate and the richer income classes that are the major recipients of remittances in developing countries.

3.1. Theoretical background: A model of access to medical services in presence of remittances

The model presented here is a simplified version of Grossman (1972) model. We exploit the specification of Zweifel et al. (1997), but we augment the model with the possibility that the individual can receive remittances to finance health expenditures.

Consider an individual with a planning horizon of two time periods. During each period he or she experiences a nonnegative amount of sick time t^s, which is the lower the larger health stock *H*. The individual derives a positive utility from consumption goods *X* while deriving disutility from sick time $t^s(H)$. The utility function defined over these arguments is assumed to be time independent. Future utility is discounted by a subjective factor $\beta \leq 1$. Thus, the individual maximizes discounted utility *U*,

$$U = U\left(t^s(H_0), X_0\right) + \beta U\left(t^s(H_1), X_1\right) \text{ with } \frac{\partial U}{\partial t^s} < 0\,,\ \frac{\partial^2 U}{\left(\partial t^s\right)^2} > 0\,, \frac{\partial U}{\partial X} > 0,\ \frac{\partial^2 U}{\partial X^2} < 0,\ \frac{\partial t^s}{\partial H} < 0. \quad (1)$$

The crucial component of the Grossman model is the equation that defines the change in the health stock over time. On the one hand, health capital depreciates at a rate δ, causing health to worsen over time. On the other hand, the individual can increase health capital by investing *I*. This involves the purchase of medical services *M* or spending t^I units of time on preventive effort. In all, one has:

$$H_1 = H_0(1-\delta) + I\left(M_0, t^I\right) \text{ with } \frac{\partial I}{\partial M} > 0,\ \frac{\partial I}{\partial t^I} > 0,\ \frac{\partial^2 I}{\partial M^2} < 0,\ \frac{\partial^2 I}{\partial\left(t^I\right)^2} < 0. \quad (2)$$

Equation (2) constitutes a constraint that will enter the individual's maximization problem.

The second constraint faced by the individual is the budget constraint. Our innovation here is that, abstracting from health insurance, health care expenditure amounting to *pM* has to be financed out of labor income, initial wealth A_0 or remittances received from abroad *L*, with w_0 denoting the wage rate of the initial period and *p* denoting the price of medical care. Remittances are targeted to buy health care, more precisely, to cover a fraction ϕ $(0 < \phi \leq 1)$ of health care expenditures *pM*.

Consumption (at price *c*) must be positive in both periods. Total time available is normalized at 1 in both periods. Altogether, the following budget constraint holds after discounting to present value with the return of saving *R*,

$$A_0 + w_0\left(1 - t_0{}^s - t^I\right) + \frac{1}{R} w_1\left(1 - t_1{}^s\left(H_1\right)\right) = pM\left(1 - \phi\right) + cX_0 + \frac{1}{R} cX_1 \tag{3}$$

To solve this maximization problem, the Lagrangean method is used,

$$\begin{aligned} \ell\left(H_1, t^I, M, X_0, X_1\right) &= U\left(t^s\left(H_0\right), X_0\right) + \beta U\left(t^s\left(H_1\right), X_1\right) + \mu\left(H_0\left(1-\delta\right) + I\left(M_0, t^I\right) - H_1\right) \\ &+ \lambda\left(A_0 + w_0\left(1 - t_0{}^s - t^I\right) + \frac{1}{R} w_1\left(1 - t_1{}^s\left(H_1\right)\right) - pM\left(1-\phi\right) - cX_0 - \frac{1}{R} cX_1\right) \end{aligned} \tag{4}$$

First-order conditions for an optimum are given by the derivatives with respect to all decisional variables. We obtain:

$$\frac{\partial \ell}{\partial H_1} = \beta \frac{\partial U}{\partial t^s} \frac{\partial t^s}{\partial H_1} - \frac{\lambda}{R} w_1 \frac{\partial t^s}{\partial H_1} - \mu = 0 \tag{5}$$

$$\frac{\partial \ell}{\partial t^I} = \mu \frac{\partial I}{\partial t^I} - \lambda w_0 = 0 \tag{6}$$

$$\frac{\partial \ell}{\partial M} = \mu \frac{\partial I}{\partial M} - \lambda p\left(1-\phi\right) = 0 \tag{7}$$

$$\frac{\partial \ell}{\partial X_0} = \frac{\partial U}{\partial X_0} - \lambda c = 0 \tag{8}$$

$$\frac{\partial \ell}{\partial X_1} = \beta \frac{\partial U}{\partial X_1} - \frac{\lambda}{R} c = 0. \tag{9}$$

Firstly, dividing equation (6) by equation (7) yields $\dfrac{\partial I/\partial t^I}{\partial I/\partial M} = \dfrac{w_0}{p(1-\phi)}$ (10)

Secondly, dividing equation (8) by equation (9) yields $\dfrac{\partial U/\partial X_0}{\partial U/\partial X_1} = \beta R$ (11)

Finally, equation (5) may be rewritten by solving (9) for $\dfrac{\lambda}{R}$,

$$-\beta \frac{\partial t^s}{\partial H_1}\left(\frac{w_1}{c}\frac{\partial U}{\partial X_1} - \frac{\partial U}{\partial t^s}\right) = \mu = \lambda \frac{p}{\partial I/\partial M}(1-\phi)$$

$$= \frac{\partial U/\partial X_0}{\partial I/\partial M}\frac{p}{c}(1-\phi), \text{ using (7) and (8)} \quad (12)$$

Our principal objective is to derive an explicit equation of medical services demand. To achieve this, we need to specify the investment function $I(M, t^I)$. It is assumed to be of the Cobb-Douglas type, $I = M^{\alpha_M}\left(t^I\right)^{1-\alpha_M} e^{\alpha_E E}$, $0 < \alpha_M < 1$, $\alpha_E > 0$. (13)

Note that education *E* serves to magnify the effects of medical services *M* and time spent in favour of health t^I.

The structural demand for medical services

To derive the structural demand curve for medical services, we first logarithmize the investment function (13). This leads to $\ln I = \alpha_M \ln M + (1-\alpha_M)\ln t^I + \alpha_E E$ (14)

With $w_0 = w_1 = w$, equation (10) can thus be rewritten as: $\dfrac{M}{t^I}\dfrac{(1-\alpha_M)}{\alpha_M} = \dfrac{w}{p(1-\phi)}$ (15)

Taking logarithms results in $\ln t^I = \ln(p) + \ln(1-\phi) + \ln(M) - \ln(w) + \ln\left(\dfrac{1-\alpha_M}{\alpha_M}\right)$ (16)

By substituting this expression into (14) yields the following equation for $\ln M$ in the case where $\delta = 1$, and thus, $\ln I = \ln H_1$ by equation (2),

$$\ln M = \ln H_1 - (1-\alpha_M)\ln(p) - (1-\alpha_M)\ln(1-\phi) + (1-\alpha_M)\ln(w) - \alpha_E E + \ln\left(\frac{1-\alpha_M}{\alpha_M}\right) \qquad (17)$$

This expression is the equation of structural demand for medical services. We can see easily that, the higher the amount of remittances received, the higher the quantity demanded.

The reduced demand function for medical services

The structural demand function for medical services (17) depends "unfortunately" on the health capital H_1 which is chosen optimally by the individual. To solve this problem, one needs first, to specify how sick time t^s depends on health capital H_1. The following functional form is assumed,

$$t^s(H_1) = \theta_1 H_1^{-\theta_2}, \ \theta_1 > 0, \theta_2 > 0. \qquad (18)$$

The derivative of t^s with respect to H_1 gives, $\frac{\partial t^s}{\partial H_1} = -\theta_1\theta_2 H_1^{-\theta_2-1}$ (19)

In the pure investment model, $\frac{\partial U}{\partial t^s} = 0$. Thus, equation (12) becomes,

$$-\beta\frac{\partial t^s}{\partial H_1}\left(\frac{w_1}{c}\frac{\partial U}{\partial X_1}\right) = \frac{\partial U/\partial X_0}{\partial I/\partial M}\frac{p}{c}(1-\phi) \qquad (20)$$

Setting $\beta = R = 1,$ using (11) and simplifying yields, $-\frac{\partial t^s}{\partial H_1}w_1 = \frac{p}{\partial I/\partial M}(1-\phi)$ (21)

From equation (19), (21) can be rewritten in the logarithmic form as,

$$\ln(p) = \ln(w_1) + \ln(\alpha_M) + (\ln I - \ln M) + \ln(\theta_1) + \ln(\theta_2) + (-\theta_2 - 1)\ln(H_1) - \ln(1-\phi) \qquad (22)$$

Recall that $\delta = 1,$ and thus, $\ln I = \ln H_1$, so (22) can be rewritten as:

$$\ln(H_1) - \ln(M) = \ln(p) + \ln(1-\phi) - \ln(w_1) - \ln(\alpha_M) - \ln(\theta_1) - \ln(\theta_2) - (-\theta_1 - 1)\ln(H_1) \qquad (23)$$

The reduced form of the demand for medical services can be obtained by the resolution of the following system of two equations:

$$\begin{cases} \ln(H_1) - \ln(M) = \ln(p) + \ln(1-\phi) - \ln(w_1) - \ln(\alpha_M) - \ln(\theta_1) - \ln(\theta_2) - (-\theta_1 - 1)\ln(H_1) \\ \ln M = \ln H_1 - (1-\alpha_M)\ln(p) - (1-\alpha_M)\ln(1-\phi) + (1-\alpha_M)\ln(w) - \alpha_E E + \ln\left(\frac{1-\alpha_M}{\alpha_M}\right) \end{cases} \quad (24)$$

Recall that the second equation of this system is the structural demand for medical services as in (17). The reduced form of the demand for medical services is given by:

$$\ln(M) = \Theta - (1+\alpha_M(\varepsilon-1))\ln(1-\phi) - (1+\alpha_M(\varepsilon-1))\ln(p) + (1+\alpha_M(\varepsilon-1))\ln(w) - (1-\varepsilon)\alpha_E E \quad (25)$$

Where $\varepsilon \equiv 1/(\theta_2+1) < 1$ and $w \equiv w_0 = w_1$.

In contrast to the structural demand function for health in (17), this function does not depend on health stock. The positive relationship between remittances and the demand for medical services is reaffirmed. The theoretical impact is given by $1+\alpha_M(\varepsilon+1)$.

3.2. Empirical framework

A number of models are evaluated in an attempt to test the specified hypotheses. Hence, a base model would be modified to fit each one of the specific hypotheses.

The base model

Specification

The primarily concern is to determine the differential effects of remittances on access to public and private health care services. We depart from an econometric model that relates remittances to the uses of those services while controlling for other potential determinants of the uses of health care services. Based on some recent studies on the access to health care services in developing countries (Gwatkin et al., 2007; Berthelemy & Seban, 2009), the following model is specified:

$$hsa_{ijt}^{\ d,s} = X'_{ijt}\beta^{d,s} + \phi^{d,s} hf_{jt} + \delta^{d,s} r_{jt} + \mu_i + \varepsilon_{ijt}^{\ d,s}$$

The variables are all expressed in logarithm term with, $hsa_{ijt}^{\ d,s}$ representing the percentage of children of the i^{th} quintile that had access to a health care service of the type *s* (public or private) in the treatment of illness *d* in the j^{th} country in the t^{th} year. *X*, *hf* and *r* represent the vector of control variables (education of mothers and per capita income), the other sources of financing health care (public spending and foreign health aid) and finally remittances flows in each country, respectively. μ_i is the quintile fixed effect and ε_{ijt} is a white noise disturbance. In the model, we control for the education of the mother as it is a key determinant of the child's health. We control as well for the level of development given that it logically exists a relationship between a country's degree of development and its populations' access to health care services.

Two coefficients are of a special interest in the current specification: the coefficient associated with the remittances (δ) and the coefficient associated with the other sources of financing (ϕ).

A serious problem in these kinds of specifications is the endogeneity of remittances, foreign aid and of public spending, as pointed out by Chauvet and al. (2008).

Endogeneity of remittances, foreign aid and public spending in health

Sources of endogeneity

A naïve estimation of the parameters of *r* and of *hf*, may lead to biased estimates if the issue of endogeneity is not taken into account. Three sources of endogeneity are generally observed: a measurement error on the considered variables, a reverse causality bias and an omitted variables bias. As far as remittances are concerned, officially recorded values are known to be measured with error. Estimates of unrecorded remittances range from 20 to 200 percent of official statistics on remittances (Freund & Spatafora, 2008). Balance of payment statistics produced by developing countries often neglect remittances received via money transfer operators and almost always exclude those transferred via informal means such as *hawala* operators, friends, and family members.

Moreover, if remittances are targeted by the migrants to directly finance the health of their siblings, this would result in a reverse and negative causality between remittances and the access to health care services in the sense that remittances would respond to a low level of household's access to health care services.

Regarding the omitted variable bias it could exist a third variable, which would simultaneously affect the level of remittances received by households and their level of access to health care services. That is especially the case for the intensity as well as of the quality of emigration in the country. For instance, international migration of physicians represents a migration of skilled individuals which in return has a clear effect on the amount of remittances received by the considered country (Adams, 2009). However, the severity of the medical brain drain may reduce the access of populations to health structures for their needs for treatment. International migration has another effect in the considered model: the effect on fiscal revenue. Indeed, although migration of individuals is positively correlated to the level of remittances, it reduces the number of tax payers which in turn leads to a lower amount of tax revenue and thus to a decrease in the level of public spending on social sectors.

The endogeneity of public spending as well as of foreign aid to the health sector may be due to a measurement error (which is more pronounced in the case of disaggregated levels of foreign aid) on the one hand, and to a simultaneity bias on the other hand. In effect, both public spending and foreign health aid are targeted to improve population access to medical services and to ensure better quality of treatments provided. In an econometric perspective, this positive reverse causality between the access to health care services and the sources of funding leads to severe estimations problems in the parameters.

Factoring in the endogeneity of remittances, public spending on health and health aid

The endogeneity of the considered variables can be dealt with in various ways. A first approach is that of a selection on *observables*. Such an approach consists in adding a large number of control variables. Such variables are supposed to be strongly correlated with the variables of interest as well as with the dependent variable. Although this approach is quite easy to implement, the strategy is based on the assumption that the researcher has controlled for all the variables such that the hypothesis of the orthogonality of the endogenous variables of interest with the error term is not rejected. However, it is impossible to think that with this approach one can control for all the implied bias. Moreover, the choice of the control variables is often conditioned by the availability of data on the control variables.

A second approach is based on the selection on *unobservables* instead. This strategy consists in the introduction in the model of fixed effects which in fact measure all other (time-invariant) determinants of access to health care services and for which a direct measure is not possible. In the current paper, we purport

to introduce quintile fixed effects to control for the heterogeneity between income quintiles. However, we cannot introduce country fixed-effect given that about 60% of our database is made up of countries with at most one year of observations on the dependent variables.

A third approach for treating for the endogeneity of the included variables is to resort to instrumental variables. A valid instrument for the variables of interest would have to satisfy three conditions. First, it would need to be correlated with the supposed endogenous variable. Second, the measurement error in the instruments would need to be uncorrelated with the measurement error in endogenous variables. Third, the instrument should not be correlated with the access to health care services, except through the endogenous variables or through the effect on the other variables that have been already controlled for. The choice of pertinent instruments for each one of the endogenous variables of our interest (remittances, public spending and foreign aid) is driven by the recent literature. As in Chauvet and al. (2008), remittances would be instrumented by the level of financial development (the ratio of broad money supply (M2) to GDP). Indeed, the greater the level of financial development, the higher the amount of remittances received, given the reduction of the transaction costs induced by the financial widening (Freund & Spatafora, 2008).

Following Filmer & Prichett (1999) and Bokhari and al. (2007), we use as instruments for public spending on health, the per capita public spending on the health sector, and the per capita spending on defense of a country's geographic neighbors. The higher is spending on defense in neighboring countries, the higher the share of military spending in the considered country's budget and thus, the lower the level of public spending on social sectors. However, it tends to be a positive correlation between spending on health in neighboring countries and spending on health in the considered country.

Concerning foreign aid on health sector, we follow the instrumentation procedure initiated by Tavarez (2003) and recently revisited by Brun and al. (2006) and Chauvet and al. (2008). The idea behind this procedure is that the level of foreign aid received by a given country from each one of the major donors is related to the various aspects of the proximity (geographical and cultural proximities) between the considered developing country and the donors. We retain 21 major OECD countries as principal sources of foreign aid to developing countries. To address the issue of geographical proximity, we use the inverse distance between a country and each of the 21 donors. Total aid send by each donor is then, weighted by the inverse geographical distance. To take into account cultural proximity, we use a dummy variable which takes 1 if the country shares the same language with the donor. We also use a dummy variable for the religious proximity between the donor and the recipient. The common language or common dominant religion dummies are used as weights for the amount of aid given by each donor. Altogether, foreign aid received by each country is instrumented by three variables.

The quality of the considered instruments should be confirmed by the performance of the specified models. On that respect, we would rely on the Stock and al. (2002) weak-instruments test and the standard over identification tests to empirically justify their use.

Are remittances complements or substitutes of foreign health aid? An econometric model of the interaction between external sources of funding

In order to test the existence of a complementary or substitutability relationships between external sources of funding in developing countries (remittances and foreign health aid), we modify the base model by adding an interaction term of remittances and health aid per capita. The following model is specified:

$$hsa_{ijt}^{\ d} = X'_{ijt}\beta^d + \phi^d hf_{jt} + \delta_1^{\ d} r_{jt} + \delta_2^{\ d}\left(r_{jt} * hf_{jt}\right) + \mu_i + \varepsilon_{ijt}^{\ d}$$

Two distinct results may derive from the estimation of this model. On the one hand, there could exist a complementary effect between remittances and health aid. In this case, the following condition should hold:

$\phi^{d,s} > 0$, $\delta_1^{d,s} > 0$ and $\delta_2^{d,s} > 0$. On the other hand, there could be a substitution effect. In that case, we should observe that $\phi^{d,s} > 0$, $\delta_1^{d,s} > 0$ and $\delta_2^{d,s} < 0$.

However, we must be cautious when interpreting the results of the model. Indeed, a low level of health aid per capita might measure either an increase of the financial constraints for a recipient country or an increase in the financial autonomy of the country. Thus, we have to take into account this duality in the econometric model. To achieve this objective, we make the assumption that a diminution in the amount of health aid in a low income country reflects the tightening of financial constraints faced by this poor country whereas it not necessarily the same interpretation for an emerging country. From an economic sense, we are testing the hypothesis that the nature of the interactions between remittances and foreign aid might be conditioned by the level of economic development (income per capita). Our preferred econometric model is then a model which allows the inclusion of a double interaction between remittances, health aid and income per capita. The following specification holds:

$$hsa_{ijt}^{d,s} = X'_{ijt}\beta^{d,s} + \phi^{d,s} Aid_{jt} + \delta_1^{d,s} r_{jt} + \delta_2^{d,s}\left(r_{jt} * Aid_{jt}\right) + \delta_3^{d,s}\left(r_{jt} * Aid_{jt} * y_{jt}\right) + \delta_4^{d,s}\left(r_{jt} * y_{jt}\right) + \delta_5^{d,s}\left(Aid_{jt} * y_{jt}\right) + \mu_i + \varepsilon_{ijt}^{d,s}$$

We are particularly interested by the cross derivative of the access to health care services with respect to remittances and foreign health aid $\left(\frac{\partial^2 hsa_{ijt}^{d,s}}{\partial r_{jt}\partial Aid_{jt}} = \delta_2^{d} + \delta_3^{d} y_{jt}\right)$.

This calculus is a way to measure empirically the substitution or the complementary effect between remittances and aid given different levels of income per capita. When δ_2^{d} and δ_3^{d} have opposite signs ($\delta_2^{d} > 0$ and $\delta_3^{d} < 0$), a threshold effect of income per capita expressed in per capita dollars terms $\left(y^* = e^{-\frac{\delta_2^d}{\delta_3^d}}\right)$ arises. Under these conditions, we can therefore conclude that remittances are a complement of health aid in poor countries and this complementary effect disappears progressively when the level of per capita income rises.

The duality behind the nature of the interactions between remittances and health depending on the level of per capita income is indeed straightforward. The hypothesis that remittances and foreign aid are complements in poor countries and substitutes in relative rich countries simply reflects the idea that poor countries need both remittances and health aid to achieve high rates of utilization of modern health care services while relative rich ones do not need absolutely the two flows.

Heterogeneity in the remittances' impacts on the access to health services by income quintiles

If median and richer classes are the primarily and the most concerned by international migration (given the cost to migrate abroad), then remittances in return are received in a larger amount by these classes in a considered country. One would expect that the impact of remittances on the access to health will be the

greatest for the third, the fourth and the fifth income quintiles. If this result is confirmed, it will posit remittances as an imperfect substitute for the other types of financing health sector in developing countries. Moreover, if remittances induce a sectorial glide in the utilization of health structures from the public to the private sector, this result should hold for the median and richer quintile in the distribution of income. As households receive remittances they would increase their search for better quality in health care delivery. Such income effects induced by remittances on the behavior of receiving households need to be taken into account in developing country. Then, if remittances do not crowd-out public funds in health sector, one may expect that public subsidies in the health sector will be received by the poorest of the remittance receiving countries.

In order to test the hypothesis of heterogeneity of the impact of remittances on the access to health care services over the income quintiles, the following specification is adopted:

$$hsa_{ijt}^{d,s} = X'_{ijt}\beta^{d,s} + \phi^{d,s} hf_{jt} + \delta^{d,s} r_{jt} + \sum_{i=2}^{5} \varphi_i^{d,s} \left(r_{jt} * \mu_i\right) + \mu_i + \varepsilon_{ijt}^{d,s}$$

where μ_i is the quintile dummy variable, i is the income quintile index. We expect that all the $\varphi_{i=3,4,5}$ parameters will be negative in the regression for the public sector and positive in the regression for the private sector.

4. DATA

Variables on the access to health care services

Data on variables on the access to health care services are taken from the study by Gwatkin *and al.* (2007) on Health, Nutrition and Population in 56 developing countries, and all the data are disaggregated by income quintiles[2]. In this database, more than half of the countries are African. The report of Gwatkin *et al.* (2007) is based on data drawn from several demographic and health surveys (DHS) conducted in these countries. These surveys target especially maternal and child health with a standardized questionnaire. Data also include socioeconomic variables like mother education for each quintile.

The report includes several indicators of health status and utilization of health services. For our work, we are only interested in the second type of indicators (access to health). Two variables on the access to health care services are chosen for our purpose:

- Treatment of fever: percent of children with fever, with or without cough or rapid breathing, in the two weeks before the survey who had sought medical advice for fever, at any medical facility or provider, whether public or private,

- Treatment of diarrhea : percent of children with diarrhea in the two weeks before the survey who had been taken for treatment, at any medical facility or provider, whether public or private,

In our analysis, we also differentiate the treatment of each disease in a public structure from that in a private structure. The geographical coverage of these data is defined in the appendix Table 1.

Per capita public spending on health sector

Data on public spending are drawn from several sources: World Development Indicators, OECD Health Database, WHO World Health Statistics, OECD Health Database and IMF Government Financial Statistics.

[2] Other studies have used this database in order to analyze the determinants of child-health outcomes and access to health in developing countries (Fay and al., 2005; Ravallion, 2007; Berthelemy & Seban, 2009).

Public spending in health for each country are in $US and divided by the total population of each country. Data on population comes from World Development Indicators.

Development assistance on health (health aid)

The existing research on global health resource flows has yielded some important estimates and findings, but it does not provide comprehensive and systematic estimates of development assistance on health (DAH) over an extended period of time. A majority of studies have relied on databases maintained by the Development Assistance Committee of the Organization for Economic Cooperation and Development (OECD-DAC). While these databases are a valuable source of information, they do not capture all the external aid on health sector. The biggest gap in coverage stems from the fact that the databases only reflect *official* development assistance (ODA) flowing from governments and leave out key private actors in the health domain like the Bill & Melinda Gates Foundation (BMGF), other private foundations, and non-governmental organizations (NGOs).

The *Institute for Health Metrics and Evaluation* (*IHME*) has launched a multi-year program for tracking DAH, which has addressed these conceptual and measurement challenges and developed a comprehensive system for global health resource tracking. The primary goal of the program is to develop consistent time-series data on DAH, which will be updated annually. The beginning year in this database is 1990. Development assistance for health is defined as financial and in-kind contributions made by channels of development assistance to improve health in developing countries. It includes all disease-specific contributions as well as general health sector support, and excludes support for allied sectors. Data are in US dollars per capita terms.

International migrants' remittances

Remittances data are drawn from the World Bank World Development Indicators Tables. Remittances are defined as the sum of three components: workers' remittances, compensation of employees and migrants' transfers. Workers' remittances are classified as current private transfers from migrant workers who are residents of the host country to recipients in their country of origin. They include only transfers made by workers who have been living in the host country for more than a year, irrespective of their immigration status. Compensation of employees is the income of migrants who have lived in the host country for less than a year. Migrants' transfers are defined as the net worth of migrants who are expected to remain in the host country for more than one year that is transferred from one country to another at the time of migration. This is the most reliable database on remittances for cross-country analysis. Data in the study are in US dollars per capita terms.

Military expenditures

Data are drawn from the *Stockholm International Peace Research Institute* (*SIPRI*). This institution publishes data on military spending for 172 countries since 1988. We use military spending in US dollars per capita terms.

Income per capita

GDP per capita in US dollars constant prices is used as a proxy for the level of development. The data come from the World Bank World Development Indicators.

Table of descriptive statistics of variables is presented in Table A1 in Appendix.

5. ECONOMETRIC RESULTS

Now, we turn to the estimation and the discussion of econometric results.

Impact of remittances, health aid and public spending on access to health care services

This subsection is devoted to the comparison of the respective impacts of remittances, health aid and public spending on the access to health services in developing countries. Tables 3 and 4 summarize these results. Table 3 presents the results of the impact of remittances and health aid on access to health services for each disease (fever and diarrhea). For each disease, we use as dependent variable, the total access to health services, the access to public and the access to private services.

We are also interested in the validity of our instrumental variable strategy. Two tests are performed in order to check the quality of our instruments. As we can see in Table 3, the F-test for the first-stage regression and the Hansen suridentification test (OID) confirm the good quality of our instrumentation[3]. Regarding the impact of our variables of interest, we find that the elasticity of access to health services with respect to remittances is positive and statistically significant for the total and private health services access. In contrast, remittances appear to have a non significant effect on the access to public health care services (column 2) and a negative effect in column (5).

Table 3: Effects of Remittances and Health aid on access to health care services

Dependent variables : Access to health services by diseases and sectors	Fever	Fever_pub	Fever_pri	Diarrhea	Diarr_pub	Diarr_pri
	(1)	(2)	(3)	(4)	(5)	(6)
Remittances per capita (log)	0.313***	0.0191	0.781***	0.152**	-0.153**	0.661***
	(2.704)	(0.242)	(3.550)	(2.226)	(-2.270)	(4.379)
Health aid per capita (log)	1.159***	0.997***	0.954	0.105	0.0147	-0.0356
	(2.909)	(3.580)	(1.300)	(0.546)	(0.0791)	(-0.0782)
GDP per capita (log)	-0.935	-0.719	-0.690	-0.104	-0.0722	-0.739
	(-0.837)	(-0.860)	(-0.330)	(-0.152)	(-0.109)	(-0.474)
(log(GDP per capita))²	0.0543	0.0625	-0.000510	-0.00222	0.0163	0.00414
	(0.688)	(1.058)	(-0.00346)	(-0.0459)	(0.353)	(0.0372)
Mother education	0.310***	0.213***	0.432***	0.272***	0.207***	0.491***
	(5.632)	(4.607)	(4.845)	(7.009)	(5.017)	(6.348)
Quintile_2	0.0301	0.0310	0.0636	0.000712	-0.0290	0.0617
	(0.238)	(0.328)	(0.286)	(0.00973)	(-0.346)	(0.379)
Quintile_3	0.0459	0.0470	0.134	0.0120	-0.0426	0.0427
	(0.354)	(0.482)	(0.603)	(0.153)	(-0.505)	(0.242)
Quintile_4	0.0799	0.00910	0.245	-0.00198	-0.130	0.107
	(0.580)	(0.0863)	(1.041)	(-0.0244)	(-1.506)	(0.606)
Quintile_5	0.163	-0.123	0.622**	0.0808	-0.247**	0.432**
	(1.061)	(-1.026)	(2.365)	(0.890)	(-2.386)	(2.140)
Constant	4.034	3.174	1.761	2.716	2.492	3.057
	(1.192)	(1.229)	(0.281)	(1.341)	(1.246)	(0.666)
Observations	380	380	378	392	392	383
Remittances instrumentation F-stat	34.80	34.80	33.94	37.40	34.80	39.18
Health aid instrumentation F-stat	16.07	16.07	15.49	18.93	16.07	18.66
Hansen OID p-value	0.86	0.11	0.13	0.34	0.07	0.94

Note : All variables in the models are in log terms except income quintiles dummies. Fever_pub, Fever_priv, Diarrhea_pub, Diarrhea_priv express the access to health services for the treatment of fever and diarrhea in public and private facilities. Mother education is available by quintiles. Remittances are instrumented by the level of financial development (ratio of broad money M2 to GDP) and health aid is instrumented by the total aid budget of the 21 main donors weighted by dummies variables which take the value 1 if donor and recipient countries share the same language or the same religion and 0 otherwise. Robust t-statistics are in parentheses. Standard errors clustered at country level. * significant at 10%; ** significant at 5%; *** significant at 1%.

Furthermore, health aid contributes to increase the total level of access to health as well as the access to public health services. These results are in conformity with the hypothesis formulated previously. Indeed, remittances improve overall access to health services in developing countries, but also induce a sectorial

[3] The instrumentation equations are presented in Tables A1-2 in Appendix.

glide of frequentation from the public sector to the private sector. We can interpret this result with the hypothesis of a search by recipient households, for higher quality of health services when their income increases. In contrast, the sectorial impact of health aid is in favour of the public services access because aid is mainly devoted to this sector.

We can also notice that the effect of health aid on the overall access to health care services is larger than the impact of remittances. This is not a surprising result given that remittances are not received by the whole population in a country while foreign aid might theoretically be consumed by all fringes of the population.

Interesting results are also found regarding control variables. For example, mother education is a major determinant of child access to health care services.

Table 4 presents the results of estimations when health aid is replaced by public spending in the model. We cannot include simultaneously the two variables because of colinearity. Indeed, health aid is financing a non negligible part of public spending in developing countries. Results are quasi similar to those of the previous model. Remittances induce a sectorial glide in the frequentation from public to private sector while public spending increase overall access to health services as well as access to public services. Moreover, the impact of remittances although large and significant on the overall access is lower than that of public spending on health. Following the results of diagnostic tests performed, our instrumentation is valid only for diarrhea equations.

Table 4: Effects of Remittances and Public Health Spending on access to health care services

Dependent variables : Access to health services by diseases and sectors	Fever (1)	Fever_pub (2)	Fever_pri (3)	Diarrhea (4)	Diarrhea_pub (5)	Diarrhea_pri (6)
Remittances per capita (log)	0.217**	0.0103	0.502***	0.275***	0.0163	0.604***
	(2.325)	(0.103)	(3.440)	(2.844)	(0.153)	(4.299)
Public health spending per capita (log)	0.365***	0.745***	-0.982***	0.380***	0.882***	-0.834***
	(3.861)	(5.690)	(-5.513)	(3.018)	(6.159)	(-4.337)
GDP per capita (log)	2.711***	2.178**	1.954	0.636	0.204	-0.504
	(3.338)	(2.214)	(1.496)	(0.903)	(0.274)	(-0.377)
(log(GDP per capita))²	-0.254***	-0.225***	-0.0945	-0.101*	-0.0961*	0.0713
	(-4.096)	(-3.037)	(-0.961)	(-1.809)	(-1.779)	(0.687)
Mother education	0.220***	0.104*	0.390***	0.270***	0.214***	0.523***
	(4.168)	(1.791)	(3.751)	(5.518)	(3.435)	(5.352)
Quintiles_2	0.0685	0.0732	0.0612	0.00294	-0.0306	-0.000208
	(0.646)	(0.640)	(0.324)	(0.0271)	(-0.262)	(-0.00119)
Quintiles_3	0.107	0.127	0.121	0.0518	-0.0299	0.0753
	(0.997)	(1.115)	(0.621)	(0.465)	(-0.243)	(0.407)
Quintiles_4	0.155	0.0960	0.320	0.00144	-0.154	0.0453
	(1.340)	(0.767)	(1.520)	(0.0115)	(-1.158)	(0.228)
Quintiles_5	0.330**	0.0934	0.669***	0.134	-0.211	0.402*
	(2.535)	(0.619)	(2.712)	(0.998)	(-1.445)	(1.790)
Constant	-5.573**	-3.840	-6.835*	0.971	2.728	0.949
	(-2.172)	(-1.225)	(-1.658)	(0.445)	(1.148)	(0.228)
Observations	218	218	218	225	225	223
Remittances instrumentation F-stat	10.88	10.88	10.88	11.47	11.47	12.73
Public spending instrumentation F-stat	52.60	52.60	52.60	51.02	51.02	50.19
Hansen OID p-value	0.001	0.003	0.028	0.18	0.097	0.244

Note : All variables in the models are in log terms except income quintiles dummies. Fever_pub, Fever_priv, Diarrhea_pub, Diarrhea_priv express the access to health services for the treatment of fever and diarrhea in public and private facilities. Mother education is available by quintiles. Remittances are instrumented by the level of financial development (ratio of broad money M2 to GDP) and public sector health spending is instrumented by the average public sector health spending per capita, and the average defense spending per capita of a country's geographic neighbors. Robust t-statistics are in parentheses. Standard errors clustered at country level. * significant at 10%; ** significant at 5%; *** significant at 1%.

Are external sources of funding complements or substitutes? Empirical results of the interactions between remittances and health aid in developing countries

In this section, we test the hypothesis that the interactions between remittances and foreign health aid might vary with the level of economic development in recipients' countries. More precisely, we test that remittances and foreign health aid are complements in relatively poor countries and somewhat substitutes in relatively rich ones.

Two econometric estimations are performed. Table 5 presents the results in the case of the two diseases retained: fever and diarrhea. The dependent variable is the overall access to health care services and our variables of interest are instrumented adequately. While interesting and similar results are observed in the both two columns, we restrict the interpretation of the results to those of column 1 in which all the diagnostic tests performed are conclusive (in column 2, the low probability taken by the Hansen OID test suggests that in this specification, our instruments are not valid).

When we look at the main results of the estimation in column 1, we notice that the hypothesis formulated here is confirmed empirically. Indeed, the cross derivative of the access to health care services (for the treatment of fever) with respect to remittances and health aid (4.22 – 0.63*log (Health aid)) is statistically significant and is conditional to the level of economic development. An optimal threshold value of per capita income arises and is evaluated at around 812$US per capita per year. Putting it differently, the cross derivative of the access to health care services is positive at low levels of income, precisely when the level of per capita income is less than 812$US. Above this value, the derivative turns to be negative.

These results suggest that remittances and foreign health aid appear to be complements in low income countries and substitutes in the others. This conclusion holds because one can think that low income countries need multiple sources of funding for their development given the high levels of needs they are faced with. Remittances and health aid when combined are thus crucial to reduce the levels of financial constraints and then, to achieve high rates of access to medical services whatever the sector. In contrast, in relatively "rich" countries, remittances and foreign health aid act as substitutes. In these countries, the achievement of high rates of utilization of medical services is not absolutely conditioned by the inflows of both remittances and health aid.

Then, even if remittances may constitute an important and stable resource for development in low income countries, health aid doesn't be reduced in response. In such countries, a special combination of remittances and foreign aid is most than ever appropriate to increase the accumulation of human capital. This is an important conclusion in the actual international debate on the financing of development.

Heterogeneity in the remittances' impact on access to health services by income quintiles: Econometric results

We have previously found that remittances lead to a sectorial glide in the uses of health care services from the public to the private sector (see Table 3 and 4). However, it is interesting to explore whether this shift comes from the behaviour of a particular income class. More precisely, we test the hypothesis that the sectorial glide in frequentation of health care services is due to the intermediate and rich classes who logically benefit the most from remittances.

Table 6 summarizes the results of estimations. The first four columns consist in the estimation of the econometric model which includes as control, health aid. When we look at the first two columns (the fever case), we observe that the coefficient of the interactions between remittances and the quintiles 3, 4 and 5 are statistically significant and negative in the public sector equation and positive in the case of private sector model.

These results are also validated in the case of diarrhea but only for quintiles 4 and 5. We can then conclude that remittances recipients' households modify their behaviour by leaving the utilization of public services to experiment the private one from which they expect a better quality of services. The last four columns present the results of the estimations of models in which we control for the impact of public spending. Similar tendencies are obtained. Remittances continue to lead to the sectorial shift in frequentation even if in this specification, the effect appears to concern only the richest class.

Table 5: Remittances and Health Aid: Complements or Substitutes?

Dependent variables : Access to health services by diseases	(1) Fever	(2) Diarrhea
Remittances per capita (log)	-3.699**	-2.907**
	(2.38)	(2.46)
log(Remittances per capita)*log(Health aid per capita)	4.219***	2.306*
	(2.90)	(1.93)
log(Remittances per capita)*log(Health aid per capita)*log(GDP per capita)	-0.630***	-0.395**
	(3.11)	(2.38)
log(Remittances per capita)*log(GDP per capita)	0.580**	0.488***
	(2.54)	(2.79)
log(Health aid per capita)*log(GDP per capita)	1.423***	1.293***
	(2.87)	(2.81)
Health Aid per capita (log)	-8.652***	-6.656**
	(2.93)	(2.45)
GDP per capita (log)	-2.459*	-0.001
	(1.92)	(0.00)
(log(GDP per capita))²	0.074	-0.112
	(0.75)	(1.02)
Mother education	0.387***	0.206***
	(6.81)	(3.79)
Quintile_2	0.010	0.012
	(0.10)	(0.11)
Quintile_3	-0.004	0.047
	(0.04)	(0.42)
Quintile_4	-0.002	0.060
	(0.02)	(0.50)
Quintile_5	0.058	0.158
	(0.45)	(1.15)
Constant	13.798***	5.599
	(2.88)	(1.18)
Observations	380	392
Joint significance probability of remittances' coefficients	0.000	0.015
Threshold level of income per capita ($US constant term)	812	341

Remittances instrumentation equation F-stat	31.764	30.854
Remittances*Health aid instrumentation equation F-stat	14.150	14.209
Remittances*Health Aid*GDP per capita instrumentation equation F-stat	16.907	16.183
Remittances*GDP per capita instrumentation equation F-stat	32.743	31.704
Health Aid*GDP per capita instrumentation equation F-stat	15.338	15.879
Health Aid instrumentation equation F-stat	14.770	14.822
Hansen OID p-value	0.100	0.002

Note : All variables in the models are in log terms except income quintiles dummies. Fever and Diarrhea express the access to health services for the treatment of fever and diarrhea in modern facilities. Mother education is available by quintiles. Remittances are instrumented by the level of financial development (ratio of broad money M2 to GDP) and health aid is instrumented by the total aid budget of the 21 main donors weighted by dummies variables which take the value 1 if donor and recipient countries share the same language or the same religion and 0 otherwise. Interactive terms are instrumented by the product of the respective instruments of each variable. Robust t-statistics are in parentheses. Standard errors clustered at country level. * significant at 10%; ** significant at 5%; *** significant at 1%.

For robustness checks, we add also to the previous specification the interaction terms of health aid per capita and each of the four quintiles dummies. Two important advantages arise from this specification. Firstly, it allows us to test the robustness of the previous results in which only remittances was interacted with quintiles dummies. Secondly, we can examine whether some impacts of health aid might also vary among quintiles of income. Results are presented in Table 7. The principal message is that the distributional and sectorial impacts of remittances remain unchanged whereas no pro-poor and no pro-rich effects of health aid are observed from our data.

Table 6: Heterogeneity of remittances' impact on access to health services among income quintiles

Dependent variables : Access to health services by diseases and sectors	Fever_ pub (1)	Fever_ priv (2)	Diarrhea_ pub (3)	Diarrhea_ priv (4)	Fever_ pub (5)	Fever_ priv (6)	Diarrhea_ pub (7)	Diarrhea_ priv (8)
Remittances per capita (log)	0.128	0.323	-0.110	0.230	0.142	0.325	0.158	0.409
	(0.721)	(1.412)	(-1.147)	(1.092)	(0.632)	(1.244)	(0.626)	(1.617)
Remittances*Quintile_2	0.0123	0.0565	0.00367	0.0167	0.00620	0.102	-0.0381	0.126
	(0.241)	(0.963)	(0.0612)	(0.207)	(0.104)	(1.140)	(-0.503)	(0.954)
Remittances*Quintile_3	-0.0852*	0.0938	-0.0659	0.00888	-0.0844	0.122	-0.135	0.0252
	(-1.883)	(1.091)	(-1.020)	(0.0934)	(-1.343)	(0.895)	(-1.253)	(0.260)
Remittances*Quintile_4	-0.219***	0.318**	-0.152*	0.307**	-0.151*	0.258	-0.157	0.403**
	(-2.621)	(2.463)	(-1.873)	(2.574)	(-1.818)	(1.456)	(-1.343)	(2.241)
Remittances*Quintile_5	-0.399***	0.371**	-0.376***	0.307*	-0.494***	0.455*	-0.428***	0.489**
	(-4.007)	(2.444)	(-3.524)	(1.958)	(-3.216)	(1.847)	(-3.016)	(2.145)
Health aid per capita (log)	1.277	-0.361	0.253	-0.740				
	(1.143)	(-0.327)	(0.412)	(-0.713)				
Public health spending per capita (log)					0.723**	-0.965***	0.867***	-0.820**
					(2.164)	(-2.825)	(2.627)	(-2.478)
GDP per capita (log)	-0.520	1.464	0.311	1.584	2.408	1.782	0.322	-0.647
	(-0.244)	(0.587)	(0.253)	(0.664)	(1.252)	(0.702)	(0.253)	(-0.245)
(GDP per capita (log))²	0.0515	-0.146	-0.00465	-0.152	-0.237	-0.0851	-0.101	0.0781
	(0.334)	(-0.818)	(-0.0512)	(-0.876)	(-1.583)	(-0.441)	(-1.034)	(0.380)
Mother education	0.169*	0.438***	0.151**	0.436***	0.0610	0.422**	0.178	0.564***
	(1.647)	(3.542)	(1.998)	(3.606)	(0.553)	(2.178)	(1.612)	(3.112)
Quintile_2	0.00975	-0.0650	-0.0209	0.0408	0.0718	-0.191	0.0745	-0.317
	(0.0741)	(-0.397)	(-0.130)	(0.179)	(0.470)	(-0.807)	(0.373)	(-0.909)
Quintile_3	0.285***	-0.102	0.156	0.0592	0.357**	-0.191	0.318	-0.0116
	(2.666)	(-0.430)	(0.954)	(0.237)	(2.218)	(-0.493)	(1.279)	(-0.0427)
Quintile_4	0.597***	-0.548	0.298	-0.598*	0.498**	-0.326	0.256	-0.953*
	(2.771)	(-1.397)	(1.347)	(-1.714)	(2.566)	(-0.603)	(0.804)	(-1.920)
Quintile_5	0.929***	-0.297	0.749***	-0.248	1.336***	-0.463	0.857***	-0.818
	(3.557)	(-0.599)	(2.647)	(-0.493)	(3.595)	(-0.604)	(2.585)	(-1.151)
Constant	1.922	-3.398	0.715	-3.300	-4.913	-5.843	1.998	1.891
	(0.301)	(-0.447)	(0.201)	(-0.474)	(-0.808)	(-0.735)	(0.498)	(0.228)

Observations	380	378	392	383	218	218	225	223
Joint Signi. of Remittances coeff. p-value	0.002	0.025	0.000	0.007	0.018	0.330	0.009	0.215
Remittances instrumentation F-test	10.83	9.74	9.29	8.82	2.95	2.95	2.48	2.33
Remittances*Quintile_2 instrum. F-test	7.43	7.05	8.28	9.29	1.99	1.99	2.12	2.46
Remittances*Quintile_3 instrum. F-test	7.61	7.09	9.79	9.50	2.02	2.02	2.42	2.47
Remittances*Quintile_4 instrum. F-test	8.31	7.88	9.11	10.58	2.04	2.04	2.47	2.52
Remittances*Quintile_5 instrum. F-test	10.17	13.18	13.15	15.33	2.69	2.69	2.98	3.14
Health aid instrumentation F-test	2.73	0.92	1.37	0.78	..	..	..	..
Public health spending instrum. F-test	..	..	..	..	5.15	5.15	5.18	5.06
Hansen OID p-value	0.64	0.23	0.14	0.05	0.13	0.29	0.34	0.57

Note: All variables in the models are in log terms except income quintiles dummies. Mother education is available by quintiles. Remittances are instrumented by the level of financial development (ratio of broad money M2 to GDP); public sector health spending is instrumented by the average public sector health spending per capita, and the average defense spending per capita of a country's geographic neighbors; health aid is instrumented by the total aid budget of the 21 main donors weighted by dummies variables which take the value 1 if donor and recipient countries share the same language or the same religion and 0 otherwise. Interaction terms are instrumented by the product of instruments of remittances with quintiles dummies. Robust t-statistics are in parentheses. Standard errors are clustered at country level. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7: Heterogeneity of remittances' and Health aid impacts on access to health services among income quintiles

Dependent variables : Access to health services by diseases and sectors	(1) Fever_pub	(2) Fever_pri	(3) Dia_pub	(4) Diar_pri
Remittances per capita (log)	0.163	0.276	-0.088	0.186
	(1.06)	(1.55)	(0.80)	(1.10)
Remittances (log)*Quintile_2	0.012	0.040	-0.015	-0.036
	(0.06)	(0.21)	(0.12)	(0.17)
Remittances (log)*Quintile_3	-0.068	0.135	-0.069	0.015
	(0.37)	(0.76)	(0.58)	(0.08)
Remittances (log)*Quintile_4	-0.228	0.438**	-0.189*	0.375**
	(1.49)	(2.05)	(1.67)	(1.99)
Remittances (log)*Quintile_5	-0.405***	0.490**	-0.402***	0.375*
	(2.75)	(2.07)	(2.61)	(1.73)
Health aid per capita (log)	1.830*	-1.613	1.243	-1.935
	(1.79)	(1.26)	(1.60)	(1.61)
Health aid per capita (log)*Quintile_2	0.010	0.250	-0.498	-0.105
	(0.01)	(0.16)	(0.50)	(0.06)
Health aid per capita (log)*Quintile_3	-0.220	1.119	-0.553	0.866
	(0.16)	(0.72)	(0.58)	(0.55)
Health aid per capita (log)*Quintile_4	-0.849	2.384	-1.040	1.858
	(0.70)	(1.44)	(1.12)	(1.30)
Health aid per capita (log)*Quintile_5	-1.365	2.730	-2.102*	2.479
	(1.16)	(1.63)	(1.85)	(1.63)
GDP per capita (log)	-0.883	1.417	0.294	1.987
	(0.87)	(1.07)	(0.40)	(1.62)
(GDP per capita (log))²	0.078	-0.145	-0.002	-0.184**
	(1.07)	(1.54)	(0.04)	(2.07)
Mother education	0.154***	0.495***	0.127***	0.469***
	(2.71)	(6.55)	(2.83)	(6.56)
Quintile_2	0.001	-0.313	0.560	0.298
	(0.00)	(0.15)	(0.43)	(0.14)
Quintile_3	0.493	-1.484	0.769	-0.912
	(0.26)	(0.74)	(0.62)	(0.46)
Quintile_4	1.561	-3.559*	1.503	-2.860
	(0.98)	(1.66)	(1.27)	(1.57)
Quintile_5	2.454	-3.678	3.110**	-3.188
	(1.56)	(1.63)	(2.12)	(1.59)
Constant	2.495	-1.773	-0.324	-3.225
	(0.77)	(0.42)	(0.14)	(0.84)
Observations	380	378	392	383
Joint Significance prob. of Remittances coefficients	0.005	0.000	0.000	0.001
Joint Significance prob. of Health aid coefficients	0.124	0.414	0.254	0.227
Remittances instrumentation F-stat	14.297	14.069	16.240	16.810
Remittances*Quintile_2 instrumentation F-stat	6.625	6.617	7.076	7.435
Remittances*Quintile_3 instrumentation F-stat	6.702	6.696	7.706	7.365
Remittances*Quintile_4 instrumentation F-stat	6.573	6.700	7.317	7.213
Remittances*Quintile_5 instrumentation F-stat	6.660	6.660	7.537	7.267
Health aid instrumentation F-stat	1.811	1.931	1.896	1.959
Health aid*Quintile_2 instrumentation F-stat	0.610	0.612	0.610	0.550
Health aid*Quintile_3 instrumentation F-stat	0.476	0.476	0.521	0.524
Health aid*Quintile_4 instrumentation F-stat	0.324	0.465	0.405	0.529
Health aid*Quintile_5 instrumentation F-stat	0.522	0.522	0.524	0.523
Hansen OID p-value	0.770	0.579	0.135	0.050

Note: All variables in the models are in log terms except income quintiles dummies. Mother education is available by quintiles. Remittances are instrumented by the level of financial development (ratio of broad money M2 to GDP); health aid is instrumented by the total aid budget of the 21 main donors weighted by dummies variables which take the value 1 if donor and recipient countries share the same language or the same religion and 0 otherwise. Interaction terms are instrumented by the product of instruments of remittances and health aid with quintiles dummies. Robust t-statistics are in parentheses. Standard errors are clustered at country level. * significant at 10%; ** significant at 5%; *** significant at 1%.

6. CONCLUDING REMARKS

This paper has examined the impacts of remittances, health aid and public health spending on access to health services in developing countries using recent intra-country data and instrumental variables methodology.

We have investigated the respective impacts of these variables on the access to health. Globally, we find that remittances, health aid and public spending are important determinants of the access to health services in recipients' countries. Another interesting result comes from the fact that, remittances lead to a sectorial glide in the uses of health care services from the public to the private sector for the intermediate and richest income class that are the major recipients of remittances in developing countries. Moreover, remittances and foreign health aid are complements for the access to health care services in "low" income countries.

In terms of policy implications, several important conclusions can be formulated. Firstly, all strategies designed to increase the reception of remittances by households are welcome because these funds help households in poorer countries to use formal health services. Secondly, the "optimal therapy" for the low income countries is the combination of remittances and foreign aid. Then, governments and donors should not reduce their spending on the health sector in low income remittances' recipient countries. Thirdly, considering the weak rates of utilization of health care facilities in developing countries in general and in African countries in particular, the role of remittances is also important given that, even if they certainly contribute to increase the access of the intermediate and the richest classes of income to private health care services, they make room for the poorest to access the public health care facilities. Therefore, remittances contribute globally to the improvement of the health access of all the layers of the population.

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A. EAST ASIA, PACIFIC	B. EUROPE, CENTRAL ASIA
Cambodia 2000	Armenia 2000
Indonesia 1997	Kazakhstan 1995
Indonesia 2002/03	Kazakhstan 1999
Philippines 1998	Kyrgyzstan 1997
Philippines 2003	Turkey 1993
Vietnam 1997	Turkey 1998
Vietnam 2002	Turkmenistan 2000
	Uzbekistan 1996
C. LATIN AMERICA, CARIBBEAN	**D. MIDDLE EAST, NORTH AFRICA**
Bolivia 1998	Egypt 1995
Bolivia 2003	Egypt 2000
Brazil 1996	Jordan 1997
Colombia 1995	Morocco 1992
Colombia 2000	Morocco 2003/04
Colombia 2005	Yemen 1997

APPENDIX

Table 1: DHS Data bases for selected developing countries

Dominican Republic 1996	**E. SOUTH ASIA**
Dominican Republic 2002	Bangladesh 1996/97
Guatemala 1995	Bangladesh 1999/2000
Guatemala 1998/99	Bangladesh 2004
Haiti 1994/95	India 1992/93
Haiti 2000	India 1998/99
Nicaragua 1997/98	Nepal 1996
Nicaragua 2001	Nepal 2001
Paraguay 1990	Pakistan 1990/91
Peru 1996	

F. SUB-SAHARAN AFRICA

Benin 1996	Mali 1995/96
Benin 2001	Mali 2001
Burkina Faso 1992/93	Mauritania 2000/01
Burkina Faso 1998/99	Mozambique 1997
Burkina Faso 2003	Mozambique 2003
Cameroon 1991	Namibia 1992
Cameroon 1998	Namibia 2000
Cameroon 2004	Niger 1998
Central African Republic 1994/95	Nigeria 1990
Chad 1996/97	Nigeria 2003
Chad 2004	Rwanda 2000
Comoros 1996	Senegal 1997
Côte d'Ivoire 1994	South Africa 1998
Eritrea 1995	Tanzania 1996

Ethiopia 2000	Tanzania 1999
Gabon 2000	Tanzania 2004
Ghana 1993	Togo 1998
Ghana 1998	Uganda 1995
Ghana 2003	Uganda 2000/01
Guinea 1999	Zambia 1996
Kenya 1993	Zambia 2001
Kenya 1998	Zimbabwe 1994
Kenya 2003	Zimbabwe 1999
Madagascar 1997	
Malawi 1992	
Malawi 2000	

Source: Gwatkin et al. (2007)

Table 2: Descriptive statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
Fever	375	3.537339	0.5315214	1.791759	4.437934
Fever_pub	375	3.074057	0.6076348	1.223776	4.200205
Fever_priv	373	2.088516	1.074513	0.0000	4.283587
Diarrhea	392	3.436393	0.4820075	2.04122	4.412798
Diarrhea_pub	392	3.002404	0.5749169	0.6931472	4.309456
Diarrhea_priv	383	1.978827	1.039611	0.0000	4.207673
GDP per capita (log)	392	6.398928	0.8994376	4.796733	8.36346
Remittances per capita (log)	392	2.455868	1.365903	0.0825321	6.013539
Health aid per capita (log)	392	1.076897	0.5323376	0.1076645	2.218926
Public health spending per capita (log)	255	2.538217	1.153726	0.278582	4.913576
Mother education (log)	392	3.589526	1.012166	0.7419373	4.612146

Table A1: Instrumentation equations for remittances and health aid per capita

Dependent Variable	Model of fever		Model of fever in public facilities		Model of fever in private facilities		Model of diarrhea		Model of diarrhea in public facilities		Model of diarrhea in public facilities	
	Rem	Aid	Rem	Aid	Rem	Aid	Rem	Aid	Rem	Aid	Rem	Aid
	1	2	3	4	5	6	7	8	9	10	11	12
Included instruments												
GDP per capita	3.904***	0.675	3.904***	0.675	3.893***	0.760	4.221***	0.858*	4.221***	0.858*	3.933***	0.951**
	(3.94)	(1.37)	(3.94)	(1.37)	(3.90)	(1.55)	(4.52)	(1.85)	(4.52)	(1.85)	(4.12)	(2.04)
GDP per capita²	-0.230***	-0.051	-0.230***	-0.051	-0.230***	-0.057	-0.255***	-0.067*	-0.255***	-0.067*	-0.234***	-0.073**
	(3.05)	(1.36)	(3.05)	(1.36)	(3.01)	(1.53)	(3.58)	(1.90)	(3.58)	(1.90)	(3.21)	(2.07)
Mother Education	-0.316***	0.040	-0.316***	0.040	-0.307***	0.038	-0.351***	0.034	-0.351***	0.034	-0.341***	0.020
	(5.62)	(1.32)	(5.62)	(1.32)	(5.31)	(1.21)	(6.48)	(1.16)	(6.48)	(1.16)	(6.01)	(0.65)
Quintiles_2	0.135	-0.013	0.135	-0.013	0.124	-0.010	0.125	-0.002	0.125	-0.002	0.128	-0.008
	(0.90)	(0.16)	(0.90)	(0.16)	(0.83)	(0.12)	(0.85)	(0.02)	(0.85)	(0.02)	(0.86)	(0.09)
Quintiles_3	0.230	-0.031	0.230	-0.031	0.216	-0.027	0.220	-0.020	0.220	-0.020	0.240	-0.014
	(1.50)	(0.36)	(1.50)	(0.36)	(1.39)	(0.31)	(1.45)	(0.24)	(1.45)	(0.24)	(1.55)	(0.17)
Quintiles_4	0.336**	-0.056	0.336**	-0.056	0.321*	-0.040	0.329**	-0.038	0.329**	-0.038	0.348**	-0.018
	(2.07)	(0.63)	(2.07)	(0.63)	(1.94)	(0.45)	(2.06)	(0.44)	(2.06)	(0.44)	(2.12)	(0.21)
Quintiles_5	0.485***	-0.058	0.485***	-0.058	0.465**	-0.052	0.477***	-0.042	0.477***	-0.042	0.493***	-0.027
	(2.70)	(0.61)	(2.70)	(0.61)	(2.53)	(0.53)	(2.70)	(0.45)	(2.70)	(0.45)	(2.71)	(0.28)
Constant	-14.240***	-1.425	-14.240***	-1.425	-14.138***	-1.649	-15.255***	-1.998	-15.255***	-1.998	-14.292***	-2.332
	(4.67)	(0.92)	(4.67)	(0.92)	(4.61)	(1.06)	(5.33)	(1.37)	(5.33)	(1.37)	(4.92)	(1.58)
Excluded instruments												
Financial development	0.856***	-0.047	0.856***	-0.047	0.843***	-0.062	0.878***	-0.031	0.878***	-0.031	0.881***	-0.031
	(8.50)	(0.86)	(8.50)	(0.86)	(8.09)	(1.14)	(9.05)	(0.61)	(9.05)	(0.61)	(8.70)	(0.59)
Aid weighted by religion	-0.025**	0.022***	-0.025**	0.022***	-0.025**	0.023***	-0.027**	0.022***	-0.027**	0.022***	-0.032***	0.024***
	(2.19)	(3.74)	(2.19)	(3.74)	(2.24)	(3.77)	(2.52)	(3.87)	(2.52)	(3.87)	(2.91)	(4.01)
Aid weighted by language	-0.058***	0.031***	-0.058***	0.031***	-0.060***	0.029***	-0.052***	0.032***	-0.052***	0.032***	-0.053***	0.034***
	(3.45)	(4.33)	(3.45)	(4.33)	(3.46)	(4.11)	(3.25)	(4.93)	(3.25)	(4.93)	(3.06)	(5.07)
Observations	380	380	380	380	378	378	392	392	392	392	383	383

Table A2: Instrumentation equations for remittances and public health spending per capita

Dependent Variable	Model of fever		Model of fever in public facilities		Model of fever in private facilities		Model of diarrhea		Model of diarrhea in public facilities		Model of diarrhea in public facilities	
	Rem	Health	Rem	Health	Rem	Health	Rem	Health	Rem	Health	Rem	Health
	1	2	3	4	5	6	7	8	9	10	11	12
Included instruments												
GDP per capita	1.531	-1.500**	1.531	-1.500**	1.531	-1.500**	2.082*	-1.848***	2.082*	-1.848***	1.925	-1.900***
	(1.18)	(2.11)	(1.18)	(2.11)	(1.18)	(2.11)	(1.71)	(2.95)	(1.71)	(2.95)	(1.54)	(2.95)
GDP per capit²	-0.053	0.189***	-0.053	0.189***	-0.053	0.189***	-0.103	0.219***	-0.103	0.219***	-0.087	0.224***
	(0.52)	(3.50)	(0.52)	(3.50)	(0.52)	(3.50)	(1.08)	(4.71)	(1.08)	(4.71)	(0.89)	(4.69)
Mother educ.	-0.209***	0.130***	-0.209***	0.130***	-0.209***	0.130***	-0.235***	0.124***	-0.235***	0.124***	-0.275***	0.112***
	(2.87)	(3.34)	(2.87)	(3.34)	(2.87)	(3.34)	(3.23)	(3.18)	(3.23)	(3.18)	(3.87)	(2.80)
Quintiles_2	0.090	-0.049	0.090	-0.049	0.090	-0.049	0.085	-0.045	0.085	-0.045	0.101	-0.041
	(0.47)	(0.57)	(0.47)	(0.57)	(0.47)	(0.57)	(0.45)	(0.55)	(0.45)	(0.55)	(0.54)	(0.50)
Quintiles_3	0.139	-0.086	0.139	-0.086	0.139	-0.086	0.126	-0.091	0.126	-0.091	0.182	-0.074
	(0.70)	(0.97)	(0.70)	(0.97)	(0.70)	(0.97)	(0.64)	(1.06)	(0.64)	(1.06)	(0.93)	(0.85)
Quintiles_4	0.205	-0.128	0.205	-0.128	0.205	-0.128	0.177	-0.127	0.177	-0.127	0.245	-0.106
	(0.97)	(1.35)	(0.97)	(1.35)	(0.97)	(1.35)	(0.84)	(1.40)	(0.84)	(1.40)	(1.17)	(1.15)
Quintiles_5	0.311	-0.187*	0.311	-0.187*	0.311	-0.187*	0.277	-0.180*	0.277	-0.180*	0.362	-0.153
	(1.29)	(1.78)	(1.29)	(1.78)	(1.29)	(1.78)	(1.16)	(1.81)	(1.16)	(1.81)	(1.52)	(1.52)
Constant	-6.972*	3.491	-6.972*	3.491	-6.972*	3.491	-8.383**	4.445**	-8.383**	4.445**	-8.073**	4.547**
	(1.75)	(1.59)	(1.75)	(1.59)	(1.75)	(1.59)	(2.23)	(2.26)	(2.23)	(2.26)	(2.11)	(2.26)
Excluded instruments												
Fin. Dev.	0.632***	-0.059	0.632***	-0.059	0.632***	-0.059	0.581***	-0.015	0.581***	-0.015	0.654***	0.009
	(4.44)	(1.04)	(4.44)	(1.04)	(4.44)	(1.04)	(4.25)	(0.28)	(4.25)	(0.28)	(4.76)	(0.16)
HSN	-0.081	0.414***	-0.081	0.414***	-0.081	0.414***	-0.051	0.407***	-0.051	0.407***	-0.050	0.407***
	(0.65)	(12.47)	(0.65)	(12.47)	(0.65)	(12.47)	(0.40)	(12.33)	(0.40)	(12.33)	(0.40)	(12.24)
MSP	0.207	-0.262***	0.207	-0.262***	0.207	-0.262***	0.244	-0.285***	0.244	-0.285***	0.205	-0.297***
	(1.44)	(6.86)	(1.44)	(6.86)	(1.44)	(6.86)	(1.65)	(7.57)	(1.65)	(7.57)	(1.38)	(7.68)
Observations	218	218	218	218	218	218	225	225	225	225	223	223

Note: HSN and MSP are average public sector health spending per capita and the average defense spending per capita of a country's geographic neighbors respectively.